

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A wafer polishing head for polishing a semiconductor wafer on a polishing pad, said polishing head comprising:

a housing including an upper housing portion;

a retaining ring having an interior cylindrical surface and defining an interior cylindrical pocket sized to carry said wafer and to laterally restrain movement of said wafer when said wafer is moved relative to said polishing pad while being polished against said polishing pad;

a wafer subcarrier attached to said retaining ring by a primary diaphragm and to said housing by a secondary diaphragm;

a resilient pneumatic annular sealing bladder coupled for fluid communication to a first pressurized pneumatic fluid to define a first pneumatic zone and attached to a first surface of a a ~~[[said]]~~ wafer stop plate adjacent said retaining ring interior cylindrical surface to receive said wafer and to support said wafer at a peripheral edge;

said resilient pneumatic annular sealing bladder defining a second pneumatic zone radially interior to said first pneumatic zone and extending between said first surface of said wafer stop plate and said wafer when said wafer is attached to said polishing head during a polishing operation and coupled for fluid communication to a second pressurized pneumatic fluid, said first surface of said wafer stop plate not being in contact with a wafer back side surface during polishing of said wafer;

said wafer ~~[[attachment]]~~ stop plate operative during non polishing periods to prevent said wafer from flexing excessively from an applied vacuum force used to hold said wafer to said polishing head during wafer loading and unloading operations; and

said first and said pressurized fluids being adjusted to achieve a predetermined polishing pressures over a front side surface of said wafer.

2. (Canceled)

3. (Canceled)

4. (Canceled)

5. (Canceled)

6. (Canceled)

7. (Canceled)

8. (Canceled)

9. (Previously Presented) A workpiece tooling head for polishing or planarizing a workpiece on a polishing pad, said polishing head comprising:

a retaining ring having an interior cylindrical surface and defining an interior cylindrical pocket sized to carry said workpiece and to laterally restrain movement of said workpiece when said workpiece is moved relative to said polishing pad while being polished against said polishing pad, said retaining ring having a lower surface that is pressed against said polishing pad by a first pressurized fluid to define a first pressure zone of said retaining ring against said polishing pad during polishing of said workpiece; and

a resilient seal disposed adjacent said retaining ring interior cylindrical surface to receive said workpiece and to support said workpiece at a peripheral edge and defining a second pressure zone between said workpiece and said polishing pad when said workpiece has been mounted to said head that is coupled for fluid communication to a second pressurized fluid;

said first and said second pressurized fluids being adjusted to achieve a predetermined polishing pressures over a front side surface of said workpiece.

10. (Currently Amended) A workpiece tooling head as in Claim 9, further comprising:

a workpiece stop plate attached to said retaining ring;

said workpiece [[attachment]] stop plate operative during non-polishing periods to prevent said workpiece from flexing an amount that would damage the structure of said workpiece from an applied vacuum force used to hold said workpiece to said polishing head during workpiece loading and unloading operations.

11. (Previously Presented) A workpiece tooling head as in Claim 9, wherein said workpiece comprises a semiconductor wafer.

12. (Previously Presented) A workpiece tooling head as in Claim 9, wherein said workpiece comprises a glass substrate.

13. (Currently Amended) A workpiece polishing head for polishing or planarizing a workpiece on a polishing pad, said polishing head comprising:

a retaining ring having an interior cylindrical surface and defining an interior cylindrical pocket sized to carry said workpiece and to laterally restrain movement of said workpiece when said workpiece is moved relative to said polishing pad while being polished against said polishing pad, said retaining ring having a lower surface that is pressed against said polishing pad by a first pressurized fluid to define a first pressure zone of said retaining ring against said polishing pad during polishing of said workpiece;

a workpiece attachment plate attached to said retaining ring for carrying said workpiece during polishing, [[; and]] said workpiece attachment plate having a plurality of resilient concentric annular sealing ridges extending from a surface of said workpiece attachment plate and defining substantially independent [[pneumatic]] pressure zones when pressed against a back side surface of said workpiece, each said [[pneumatic]] pressure zone being coupled for fluid communication to a source of pressurized [[pneumatic]] fluid;

a first one of said plurality of resilient concentric annular sealing ridges being disposed adjacent said retaining ring interior cylindrical surface to receive said workpiece and to support said workpiece proximate a peripheral edge and defining a second [[pneumatic]] pressure zone, said second [[pneumatic]] pressure zone being coupled for fluid communication to a second pressurized [[pneumatic]] fluid;

a second one of said plurality of resilient concentric annular sealing ridges being disposed interior to said first annular sealing ridges and coupled for fluid communication to a third pressurized [[pneumatic]] fluid; and

said first, said second, and said third pressurized fluids being adjusted to achieve a predetermined polishing pressure profile between said polishing pad and a front side surface of said workpiece during polishing.

14. (Currently Amended) A workpiece polishing head as in claim 13, wherein said workpiece attachment plate further includes a workpiece stop plate [[is further]] operative during non-polishing periods to prevent said workpiece from flexing an amount that would damage the structure of said workpiece from an applied vacuum force used to hold said workpiece to said polishing head during workpiece loading and unloading operations.

15. (Previously Presented) A workpiece polishing head as in claim 13, wherein said workpiece comprises a semiconductor wafer.

16. (Previously Presented) A workpiece polishing head as in claim 13, wherein said workpiece comprises a glass substrate.

17. (Withdrawn) A method for processing a substrate having a front side surface and a backside surface on a processing tool, said method comprising:

defining a first annular pressure zone with a first sealing member;

defining a second pressure zone radially interior to said first zone with a second sealing member;

developing first and second pressures respectively in said first and said second pressure zones;

contacting said backside surface of said substrate with said first and second sealing members without an intervening structure so that said front side surface of said substrate is pressed against said processing tool according to said defined first and second pressures; and

adjusting said first and second pressures to achieve a desired substrate material remove characteristic across said front side surface of said substrate.

18. (Withdrawn) The method in Claim 17, further comprising the steps of:

retaining said substrate within a cylindrical pocket defined by a retaining ring and sized to carry said substrate and to laterally restrain movement of said substrate when said substrate is moved relative to said processing tool during processing; and

defining an annular retaining ring pressure zone surrounding and substantially concentric with said first annular pneumatic pressure zone to press a contact surface of a retaining ring against said processing tool during processing.

19. (Withdrawn) The method of Claim 18, wherein said annular retaining ring pressure zone is defined to be a pressure that alters a substrate material removal rate proximate a peripheral edge of said substrate to reduce under removal or over removal of material from a front side surface of said substrate relative to interior portions of said substrate.

20. (Withdrawn) The method in Claim 17, wherein said substrate material removal comprises substantially uniform material removal across said front side surface of said substrate.

21. (Withdrawn) The method in Claim 17, wherein said substrate comprises a semiconductor material.

22. (Withdrawn) A semiconductor wafer made by the process in claim 17.

23. (Currently Amended) In a substrate planarization machine of the type having a retaining ring for retaining the substrate to a substrate carrier during planarization against a polishing pad, the [[planarization]] planarization machine characterized in that: a diaphragm mounts said substrate and is supported from a floating retaining ring.

24. (Currently Amended) The substrate planarization machine in claim 23 [[24]], further characterized in that said substrate is a substrate selected from the set of substrates consisting of a glass material, a semiconductor material, a metallic material, and combinations thereof.

25. (Previously Presented) In a substrate processing machine of the type having a floating retaining ring for retaining a substrate to a substrate carrier during processing against a material removal tool, the processing machine characterized in that an open diaphragm supported from said floating retaining ring presses said substrate against said material removal tool during said processing while said retaining ring retains said substrate.

26. (New) In a polishing head, a method for holding and polishing a semiconductor wafer on a polishing pad, said method comprising:

laterally restraining movement of said wafer with a retaining ring having an interior cylindrical surface and defining an interior cylindrical pocket sized to fit said wafer when said wafer is moved relative to said polishing pad while being polished against said polishing pad;

attaching a wafer subcarrier to said retaining ring by a primary diaphragm and to said housing by a secondary diaphragm and carrying said wafer with said wafer subcarrier during polishing;

defining a first pneumatic zone with a resilient pneumatic annular sealing bladder coupled for fluid communication to a first pressurized pneumatic fluid and attaching said sealing bladder to a first surface of a wafer stop plate adjacent said retaining ring interior cylindrical surface to receive said wafer and to support said wafer at a peripheral edge;

defining a second pneumatic zone with said resilient pneumatic annular sealing bladder radially interior to said first pneumatic zone and extending between said first surface of said wafer stop plate and said wafer when said wafer is attached to said polishing head during a polishing operation and coupling the second pneumatic zone for fluid communication to a second pressurized pneumatic fluid;

maintaining a non-contacting separation between said first surface of said wafer stop plate and a wafer back side surface during polishing of said wafer, said wafer stop plate operative during non-polishing periods to prevent said wafer from flexing excessively from an applied vacuum force used to hold said wafer to said polishing head during a wafer loading and a wafer unloading operation; and

adjusting said first and said pressurized fluids to achieve a predetermined polishing pressure profile over a front side surface of said wafer.

27. (New) A semiconductor wafer made by the process in claim 26.

28. (New) A method of polishing or planarizing a workpiece on a polishing pad with a polishing head, said method comprising:

laterally restraining movement of said wafer with a retaining ring having an interior cylindrical surface and defining an interior cylindrical pocket sized to fit said wafer when said wafer

is moved relative to said polishing pad while being polished against said polishing pad;

pressing a lower surface of said retaining ring against said polishing pad by applying a first pressurized fluid to define a first pressure zone of said retaining ring against said polishing pad during polishing of said workpiece; and

receiving said workpiece and supporting said workpiece at a peripheral edge by defining a second pressure zone between said workpiece and said polishing pad, said second pressure zone being defined by providing a resilient seal disposed adjacent to said retaining ring interior cylindrical surface that receives the workpiece;

coupling a first pressurized fluid to said first pressure zone and a second pressurized fluid to said second pressure zone; and

adjusting said first and said second pressurized fluids to achieve a predetermined polishing pressures over a front side surface of said workpiece.

29. (New) A method as in claim 28, wherein the workpiece comprises a semiconductor wafer.

30. (New) A workpiece made by the process in claim 28.

31. (New) A semiconductor wafer made by the process in claim 30.